WHAT IS CLAIMED IS:

1. A method for constructing routing/forwarding tables for an IP (Internet Protocol) address lookup using a skip list, comprising the steps of:

dividing a prefix length range of an IP address in a preset method;

creating a header node having a maximum level based on a number of clusters divided into the prefix length range, the header node pointing every node in the skip list; and

creating subnodes by the number of the divided clusters, the subnodes each having the divided prefix length range as a key.

2. The method as claimed in claim 1, further comprising the step of storing route entries corresponding to the respective prefix lengths in a corresponding prefix length range in hash tables provided according to the prefix lengths in each subnode.

3. The method as claimed in claim 2, wherein the route entries are comprised of 32 bits or 128 bits.

4. The method as claimed in claim 1, wherein a level of the header node of the subnode is randomly set.

5. The method as claimed in claim 1, wherein the prefix length range is divided fixedly or variably.

6. The method as claimed in claim 1, the prefix length range is divided such that every prefix length range is covered through the subnodes.

7. The method as claimed in claim 1, wherein the routing/forwarding tables are included in a routing processor and a forwarding engine, respectively.

8. A method for creating IP routing/forwarding tables using a skip list, comprising the steps of:

creating a header node for pointing each node to handle every node in the skip list;

creating a plurality of subnodes having as a key a prefix range of an IP address divided in a preset method; and

creating hash tables according to prefix lengths to store route entries according to prefix lengths in a corresponding prefix length range in each subnode.

9. The method as claimed in claim 8, further comprising the step of storing route entries matching to a corresponding prefix in the hash tables.

10. The method as claimed in claim 8, wherein a level of the header node of the subnode is randomly set.

11. The method as claimed in claim 8, wherein the prefix length range is divided fixedly or variably.

12. The method as claimed in claim 8, wherein the prefix length range is divided such that every prefix length range should be covered through a plurality of subnodes.

13. The method as claimed in claim 8, wherein the route entries are comprised of 32 or 128 bits.

14. The method as claimed in claim 8, wherein the header node has a $+\infty$ key value and forward pointer(s) indexed 0 through a maximum level minus one.

15. The method as claimed in claim 8, wherein the routing/forwarding tables are included in a routing processor and a forwarding engine, respectively.

16. A method for searching routing/forwarding tables using a skip list in which route entries are stored in a form of a hash table according to a prefix length set in each node created according to assignment of a prefix range of an IP address, comprising the steps of:

finding a node in which a prefix range corresponding to a prefix length of a route to be searched is set;

finding a hash table with the same prefix length as the route to be searched in the found node; and

finding the search route from the found hash table.

17. The method as claimed in claim 16, wherein the node finding step comprises the steps of:

finding a node for pointing from a maximum level of the header node of the skip list;

comparing a prefix length range of the found node with a prefix length of the search route; and

finding a node pointed at a next level of the header node when the prefix length of the search route does not correspond to the prefix length range of the found node.

18. The method as claimed in claim 16, wherein the skip list includes a header node and a plurality of nodes each having a key in a range preset in a descending order and storing route entries corresponding to the respective prefix lengths in the hash tables associated with the respective prefix lengths.

19. The method as claimed in claim 16, wherein the routing/forwarding tables are included in a routing processor and a forwarding engine, respectively.

20. The method as claimed in claim 16, wherein the route entries are comprised of 32 bits or 128 bits.

21. A method for updating routing/forwarding tables using a skip list in which route entries are stored in a form of a hash table according to a prefix length set in each node generated according to a prefix length range of an IP address, comprising the steps of:

finding a node in which a prefix range corresponding to a prefix length of a route to be updated is set;

searching a hash table having a same prefix length as that of the route to be updated in the

found node; and

updating a corresponding route in the hash table, when the hash table is found.

22. The method as claimed in claim 21, wherein the node finding step comprises the steps of:

finding a node for pointing from a maximum level of the header node of the skip list;

comparing a prefix length range of the found node with a prefix length of the route to be updated; and

finding a node pointed at a next level of the header node when the prefix length of the route to be updated does not correspond to the prefix length range of the found node.

23. The method as claimed in claim 21, wherein the route updating step comprises the step of adding, changing or deleting the route to be updated.

24. The method as claimed in claim 21, further comprising the steps of:

creating a hash table having the same prefix as the route to be updated, when the hash table is not found; and

inserting the route to be updated in the created hash table.

25. The method as claimed in claim 21, wherein the skip list comprises a header node and a plurality of nodes each having a key in a range preset in a descending order and storing route entries corresponding to the respective prefix lengths in the hash tables associated with the respective prefix lengths.

26. The method as claimed in claim 21, wherein the routing/forwarding tables are included in a routing processor and a forwarding engine, respectively.

27. The method as claimed in claim 21, wherein the route entries are comprised of 32 bits or 128 bits.

28. A route lookup method of routing/forwarding tables using a skip list in which route entries are stored in a form of a hash table according to preset prefix lengths in each node generated according to assignment of prefix range of an IP address, comprising the steps of:

finding an adjacent node starting from a first node of the skip list;

comparing a destination address with respective hash tables at a corresponding node; and

considering a matching prefix as a longest prefix, when the hash table includes the destination address.

29. The route lookup method as claimed in claim 28, further comprising the step of finding a next node in the skip list when the hash table does not include the destination IP address.

30. The route lookup method as claimed in claim 28, wherein the skip list comprises a header node and a plurality of nodes each having a key in a range preset in a descending order and storing route entries corresponding to the respective prefix lengths in the hash tables associated with the respective prefix lengths.

31. The route lookup method as claimed in claim 28, wherein the comparison step comprises the steps of:

comparing the destination address with a hash table having a longest prefix length, out of the hash tables of the corresponding node; and

comparing a next hash table having a next longest prefix length with the destination address when the destination address is not found in the hash table having the longest prefix length.

32. The route lookup method as claimed in claim 28, wherein the routing/forwarding lookup tables are included in a routing processor and a forwarding engine, respectively.

33. The route lookup method as claimed in claim 28, wherein the route entries are comprised of 32 bits or 128 bits.

34. A high-speed IP router comprising:

a plurality of line card modules each equipped with a forwarding engine through which packets are input and output;

a switch fabric for switching the packets between internal ports; and

a routing processor including a routing table having a skip list architecture comprised of a header node and a plurality of nodes each created according to a prefix range of an IP address, having the prefix length range as a key and storing route entries in a form of hash table according to a set prefix length.

35. A high-speed IP router comprising:

a plurality of line card modules equipped with a forwarding engine having a forwarding table with a skip list architecture comprised of a header node and a plurality of nodes each created according to a prefix range of an IP address, having the prefix length range as a key and storing route entries in a form of hash table according to a set prefix length;

a switch fabric for switching the packets between internal ports; and

routing processor for controlling an overall routing operation.

36. The high-speed IP router as claimed in claim 35, wherein the routing processor comprises a routing table having a skip list architecture comprised of a header node and a plurality of nodes each created according to a prefix range of an IP address, having the prefix length range as a key and storing route entries in a form of hash table according to a set prefix length.